MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2018/2019

TIC 3151 – ARTIFICIAL INTELLIGENCE

(TC01)

23 OCTOBER 2018
2.30 p.m – 4.30 p.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **6** pages with FOUR questions only.
2. Answer **ALL** questions.
3. Please write all your answers in the Answer Booklet provided.

QUESTION 1

(a) A Pedagogical Agent in an Intelligent Tutoring System (ITS) is designed to help a student learns new concepts. A student starts from zero knowledge about the concept, but ultimately acquired new concepts. In ITS, the agent provides different teaching materials and prompts questions from time to time to help the learning process.

Based on the above scenario, how do you represent the *Initial State*, *Goal Test*, and *Action* for the agent?

[3 marks]

(b) Which of the following agent architecture fits Question 1(a)? Name the type of agent.

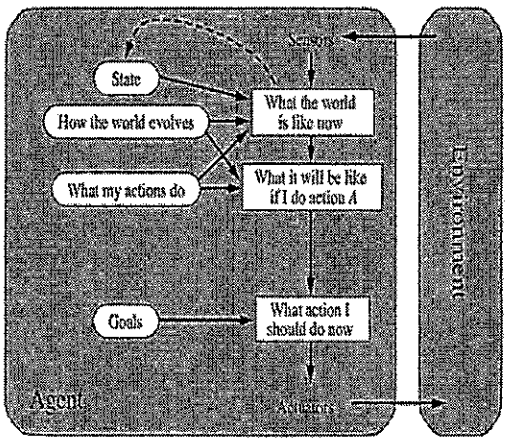


Figure 1(a)

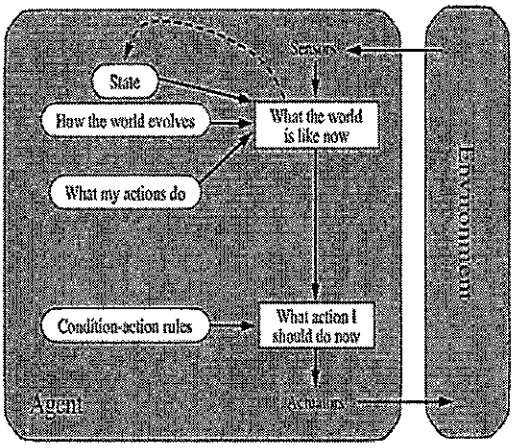


Figure 1(b)

[4 marks]

(c) Name any THREE(3) properties of task environments.

[3 marks]

Continued...

QUESTION 2

(a) Discuss any TWO(2) characteristics of a domain that Bayesian Networks are suitable for.

[2 marks]

(b) Modeling political risk of a country is difficult. The difficulty stemmed mainly due to the uncertainty inherent in identifying the variables and the causal relationships between the variables. Assuming that you are given the following information:

Political risk is influenced by (i) *Social Stability*, (ii) *Government Stability*, (iii) *Business Environment*, and (iv) *Economic Policy*. *Government Stability* can be inferred from evidence about *election*.

Create a Bayesian Network based on the given information.

[6 marks]

(c) The *amount of information needed* to decide if an arbitrary example in S belongs to ***Yes*** or ***No***.

Study the table below and calculate *I(yes,no)* for the class label.

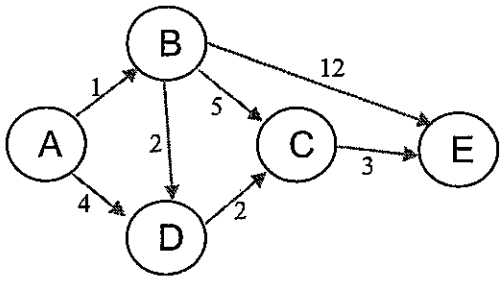
RID	Age	Income	Student	Credit_Rating	Class
1	<=30	High	No	Fair	No
2	<=30	High	No	Excellent	No
3	31...40	High	No	Fair	Yes
4	>40	Medium	No	Fair	Yes
5	>40	Low	Yes	Fair	Yes
6	>40	Low	Yes	Excellent	No
7	31...40	Low	Yes	Excellent	Yes
8	<=30	Medium	No	Fair	No
9	<=30	Low	Yes	Fair	Yes
10	>40	Medium	Yes	Fair	Yes
11	<=30	Medium	Yes	Excellent	Yes
12	31...40	Medium	No	Excellent	Yes
13	31...40	High	Yes	Fair	Yes
14	>40	medium	No	Excellent	No

[2 mark]

Continued...

QUESTION 3

(a) Study the figure and table below carefully.



State	H
A	7
B	6
C	1
D	2
E	0

Draw the *search tree* using A* algorithm. The search tree must clearly indicate the node traversal and the **f** value. Write your solution.

[5 marks]

(b) *Hill-Climbing* Search is different from other search algorithms such as Depth-First Search and A* Search. Name TWO(2) characteristics of *Hill-Climbing* Search that make the difference.

[1 mark]

Continued...

(c) Following are steps in Genetic Algorithm. What are Step no. 5 and 6?

[4 marks]

Step 1	Generate random population of n chromosomes
Step 2	Evaluate the fitness f(x) of each chromosome x in the population
Step 3	Create a new population by repeating following steps until the new population is complete
Step 4	Select two parent chromosomes from a population according to their fitness (the better fitness, the bigger chance to be selected)
Step 5	
Step 6	
Step 7	Place new offspring in a new population.
Step 8	Use newly generated population for a further run of algorithm.
Step 9	If the end condition is satisfied, stop, and return the best solution in current population Loop Go to step 2

Continued...

QUESTION 4

Study the following sentences in Knowledge Base (KB) carefully before answering Question 4(a) and 4(b).

Richard lives in Cyborjeye.
People living in Cyborjeye are suffering from high fever.
High fever indicates dengue fever.

(a) Translate the above sentences into *first-order logic* sentences.

[3 marks]

(b) Convert the *first-order logic* sentences as in Question 4(a) into Conjunctive Normal Form (CNF) and apply resolution refutation to prove that the Knowledge Base (KB) entails sentence

"*Richard is having dengue fever.*"

[7 marks]

End of pages.